

CLAIMS

- 5 1. A method of inserting a message in an image, the message comprising binary symbols which are each referenced by an index, comprising, for a coefficient of the image, the steps of:
- determining a watermarked value of the coefficient, according to the binary value of a symbol of the message and according to the index of the
 - 10 symbol,
 - inserting the watermarked value in place of the value of the coefficient.
- 15 2. An insertion method according to Claim 1, wherein the watermarked value is selected from a range of values determined around the value of the coefficient according to a psycho-visual model.
- 20 3. An insertion method according to Claim 1, wherein the determination of a watermarked value of the coefficient comprises:
- selecting a modified value of the coefficient,
 - determining a symbol index, according to the modified value and a first predetermined function,
 - determining the value of the message symbol corresponding to the predetermined index,
 - 25 - verifying that the value of the symbol previously determined corresponds to the transformation of the modified value by a second predetermined function.
- 30 4. An insertion method according to Claim 3, wherein, if the value of the symbol previously determined corresponds to the transformation of the modified value by a second predetermined function, the method comprises the step of:

- testing for determining whether the number of times the symbol has already been inserted in a coefficient of the image is the lowest amongst all the symbols whose index was determined according to the modified value and the first predetermined function and whose value corresponds to the transformation
 5 of the modified value by the second predetermined function, for the coefficient in question.

5. An insertion method according to Claim 1, wherein the insertion of the binary symbols is carried out on the value of the luminance of the pixels of
 10 the image.

6. An insertion method according to Claim 1, wherein said index of the symbol is automatically determined in accordance with the coefficient.

15 7. A method of extracting a message from an image, the message having been inserted by the method according to Claim 1, comprising the steps of:

- calculating a symbol index and a binary value according to the watermarked value of the coefficient, for each coefficient of the image,
- 20 - totaling the number of each of the binary values obtained for each of the symbols,
- allocating to each symbol the binary value having the largest total.

8. An extraction method according to Claim 7, wherein, for a
 25 coefficient, the symbol index is determined according to the watermarked value of the coefficient and the first predetermined function.

9. An extraction method according to Claim 7, wherein, for a coefficient, the binary value of the symbol is determined according to the
 30 watermarked value of the coefficient and the second predetermined function.

10. A method of extracting a message from an image, the message having been inserted by the method according to Claim 1, comprising the steps of:

- calculating a symbol index according to the watermarked value of
5 the coefficient, for each coefficient of the image,
- calculating a first and a second value according to the watermarked value, for each coefficient of the image,
- first totaling of the absolute values of the differences between the watermarked value and the first value, for each symbol,
- 10 - second totaling of the absolute values of the differences between the watermarked value and the second value, for each symbol,
- allocating to each symbol a binary value according to the smallest total amongst the first and second totals.

15 11. An extraction method according to Claim 10, wherein, for a coefficient, the symbol index is determined according to the watermarked value of the coefficient and the first predetermined function.

20 12. A device for inserting a message in an image, the message containing binary symbols which are each referenced by an index, comprising:

- means of determining a watermarked value of a coefficient of the image, according to the binary value of a symbol of the message and according to the index of the symbol,
- means of inserting the watermarked value in place of the value of
25 the coefficient.

13. An insertion device according to Claim 12, wherein the determination means are adapted to select the watermarked value from a range of values determined around the value of the coefficient according to a
30 psycho-visual model.

14. An insertion device according to Claim 12, wherein the means of determining a watermarked value of the coefficient comprise:

- means of selecting a modified value of the coefficient,
 - means of determining a symbol index, according to the modified
- 5 value and a first predetermined function,
- means of determining the value of the message symbol corresponding to the predetermined index,
 - means of verifying that the value of the symbol previously
- determined corresponds to the transformation of the modified value by a
- 10 second predetermined function.

15. An insertion device according to Claim 14, comprising:

- test means, if the value of the previously determined symbol corresponds to the transformation of the value modified by a second
- 15 predetermined function, for determining whether the number of times the symbol has already been inserted in a coefficient of the image is the lowest amongst all the symbols whose index was determined according to the modified value and the first predetermined function and whose value corresponds to the transformation of the modified value by the second
- 20 predetermined function, for the coefficient in question.

16. An insertion device according to Claim 12, being adapted to carry out the insertion of the binary symbols on the luminance value of the pixels of the image.

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17. An insertion device according to claim 12, wherein said index of the symbol is automatically determined in accordance with the coefficient.

18. A device for extracting a message from an image, the message

30 having been inserted by the device according to any one of Claims 12 to 17, comprising:

- means of calculating a symbol index and a binary value according to the watermarked value of the coefficient, for each coefficient of the image,

- means of totaling the number of each of the binary values obtained for each of the symbols,

5 - means of allocating to each symbol the binary value having the largest total.

19. An extraction device according to Claim 18, being adapted to determine, for a coefficient, the symbol index according to the watermarked
10 value of the coefficient and the first predetermined function.

20. An extraction device according to Claim 18, being adapted to determine, for a coefficient, the binary value of the symbol according to the watermarked value of the coefficient and the second predetermined function.

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21. A device for extracting a message from an image, the message having been inserted by the method according to Claim 1, comprising:

- means of calculating a symbol index according to the watermarked value of the coefficient, for each coefficient of the image,

20 - means of calculating first and second values according to the watermarked value, for each coefficient of the image,

- means of first totaling of the absolute values of the differences between the watermarked value and the first value, for each symbol,

25 - means of second totaling of the absolute values of the differences between the watermarked value and the second value, for each symbol,

- means of allocating to each symbol a binary value according to the smallest total amongst the first and second totals.

22. An extraction device according to Claim 21, being adapted to
30 determine, for a coefficient, the symbol index according to the watermarked value of the coefficient and the first predetermined function.

23. An insertion device according to Claim 12, wherein the determination and insertion means are incorporated in:

- a microprocessor,
- a read only memory containing a program for processing the data,

5 and

- a random access memory containing registers adapted to record variables modified during the execution of said program.

24. An extraction device according to Claim 18, wherein the calculation, totaling and allocation means are incorporated in:

- a microprocessor,
- a read only memory containing a program for processing the data,

and

- a random access memory containing registers adapted to record variables modified during the execution of said program.

25. An apparatus for processing a digital image, comprising means adapted to implement the method according to Claim 1.

26. Apparatus for processing a digital image, comprising the device according to Claim 12.